

Value	Design and Engineering	Construction and Procurement	Asset Management	Operations	Information Management	Safety in Design	Reputation and Engagement	Tangible Value	Intangible Value	Time Value	Cost Value	Quality Value	BIM in NZ Case Study	Comments
Improved collective understanding of design intent through the use of 3D and / or immersive visualisations	●	●	●	●		●	●		●			●	●	The model can be used to better understand and evaluate concepts that carry through the whole life of a built asset.
Enhanced engagement with project stakeholders through the use of 3D and / or immersive visualisations	●	●	●	●		●	●		●			●	●	Not everybody can read a technical drawing, so more effective means of visual communication are an easy way to add value to the delivery of a project.
Enhanced 'what if' scenario planning through using the 3D model to support the planning process	●		●	●		●			●	●		●	●	A record model (as built) can be used during the planning stage to model potential future requirements and understand the effects of proposed solutions.
Optimised maintenance and / or clearance zone checking through setting rules within the 3D models to allow the automated checking of clearance zones for maintenance.	●	●	●	●		●	●		●			●		This supports the safe access to, and efficient maintenance of, maintainable assets.
Improved budget control through virtual model-based quantity take-off	●	●			●		●		●		●	●	●	The semi-automated creation of cost plans allows greater interrogation of design and construction options and associated costs.
Reduced construction tender risk through the provision of 3D models during the tender process	●	●			●	●		●			●	●	●	Provision of the 3D model as part of the construction tender allows the contractor to interrogate and better understand the design intent, better plan construction methodology
Reduced design and construction risk through improvements in spatial coordination earlier in the design process.	●	●							●	●		●	●	Early spatial coordination supports a reduction in design changes and RFIs.
Early identification and mitigation of potential changes during construction through using the 3D model to identify issues before they arise on site	●	●						●		●	●	●	●	The 3D model can be used to automate design coordination which can reduce unknowns such as RFI's and Variations. Benchmark RFI and variation count and cost vs historical data for a tangible measure.
Improved construction method statements through using animations and / or still images of the model to aid communication.		●				●	●		●	●		●	●	This supports clear communication of the proposed construction method and mitigates the risk of misinterpretation.

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Improved construction logistics planning through using the model to map crane operations, material handling, equipment movements, etc.		●				●	●		●	●		●		This allows better understanding of activities being carried out in parallel, reducing the risk of interference to construction work and other on-site activities.
Reduced construction time and installation risk through implementing a digital site set out process	●	●	●			●		●		●	●	●		Digital site set out for foundations has been shown to result in an estimated 50% reduction in set up time and an estimated 70% reduction in as building time, with improved accuracy.
Optimised data transfer into Asset Information Management Systems through clearly defining information requirements and implementing a robust information management process			●	●	●			●		●	●	●	●	This allows operations and maintenance teams to have timely access to accurate asset information, thereby allowing for better decision making and forecasting. Benchmark time taken to populate asset database vs historical data for a tangible measure.
Improved asset management through greater certainty, transparency and availability of graphical and non-graphical asset data.			●	●				●		●	●		●	Making sure that the right people have access to the right information at the right time will streamline the asset management process. Benchmark time taken to close work orders, average cost of work orders vs historical data for a tangible measure.

Case study matrix

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Bracken Rd Flats Revisit												•	•	<p>The Bracken Road project demonstrated how BIM outputs could be used to populate asset and facilities management systems – particularly when there is little or no data available on an asset.</p> <p>Council’s day-to-day maintenance activity improved as building managers worked with a more detailed picture showing the location and status of building components, such as plumbing and HVAC systems. Tradespeople also benefitted, working with clearer instructions about what to look for and where to find it when they attended a job.</p>
North Shore Hospital Elective Surgery Centre	•	•	•				•	•						<p>By using BIM to optimise the facility layout in the design phase, WDHB CEO Dale Bramley anticipated that operations would cost approximately 20% less than average.</p> <p>It is estimated that the use of BIM saved several weeks in project time, compared with the usual process.</p> <p>Outstanding benefit was seen in the time saved in communicating design.</p>
Kathleen Kilgour Centre	•	•	•				•	•				•	•	<p>The term “build before you build” best describes how digital prototyping with BIM was used to test the design and ensure a fit-for-purpose result.</p> <p>The Kathleen Kilgour Centre needed to be built within a tight timeframe. This was achieved with collaborative and integrated project delivery methods enabled by BIM.</p> <p>BIM reduced the risks on the project. It was designed with fewer clashes and issues than could be expected on a technically complex project.</p>

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UoA Undergrad Labs	•	•					•	•				•		<p>BIM allowed the estimators, contractors and subcontractors to visualise and co-ordinate a fully integrated system before and during installation, resulting in reduced material and labour waste, and a shorter construction time, saving almost two weeks in a very tight programme.</p> <p>Without BIM we would not have achieved our programme timeframe without significant additional resource and associated cost.” COLLEEN SETH, UNIVERSITY OF AUCKLAND PROPERTY SERVICES</p>
Unitec Integrated Information System												•	•	<p>Unitec now has one source of building information that gives instant access to accurate and up-to-date space information including floor plans, space planning reports, maintenance schedules and reports. Without BIM most of this information would take days or weeks to produce.</p> <p>Generally, BIM has produced better quality information, boosted productivity, improved user satisfaction, increased FM&O workflow efficiency and driven opportunities for innovation.</p> <p>Looking at the average cost of completing FM&O tasks using and maintaining building information in the traditional way, the implementation of BIM for FM amounts to an average saving of \$7,200 per year.</p> <p>Additionally, the availability of BIM models saves at least \$5,000 on each BIM-based capital project at Unitec, as it eliminates the need to produce a base model of the building, every time.</p> <p>Assuming an average of two BIM-based capital projects are undertaken each year in the shorter term, the total cost saving</p>

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Ara Institute Kahukura Block	•	•	•		•	•								<p>to Unitec will be around \$27,000 per year, which represents an annual return on investment of approximately 23%.</p> <p>Using BIM saved time, therefore, money throughout the design stages of this complex project. For example, it enabled production of the developed design cost plan in 20 hours instead of the usual one to two weeks required for a traditional, non-digital process</p> <p>“5D BIM definitely helped us reach our budget targets.” JON BRUWER CAPITAL WORKS PROGRAMME MANAGER, ARA</p> <p>Ara understood the value of using BIM and saw that it enabled a process to achieve excellence from their consultant team. Importantly, the client endorsed this sharing of information, recognising that collaboration was essential to successful delivery.</p>
Mason Bros. Commercial Precinct												•	•	<p>“Leveraging BIM across the project lifecycle with Autodesk tools helped achieve better project outcomes with connected teams in the cloud, reduced project risk, improved worker safety and, ultimately, a smoother handover process so that operations could begin on day one.” BROOK POTTER, SENIOR BUSINESS MANAGER, AUTODESK</p> <p>Electronic delivery of data helped drive a far better as-built handover to the client.</p> <p>The tangible cost savings for Precinct from using BIM for asset management are many, driven by access to information and the resulting time savings for consultancy.</p> <p>“Many people talk about the benefits that BIM can deliver to a project in design and construction. Fewer talk about the benefits that BIM can bring to the asset management and</p>

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														operations stages where the most benefit can be achieved.” DAVE LUXTON, DEVELOPMENT MANAGER, PRECINCT PROPERTIES
UoC Structural Engineering Lab							•	•						<p>BIM streamlined construction. The reason for using BIM was partly to do with some of the building elements having no tolerance, so the importance of accuracy and coordination was of high importance.</p> <p>The accuracy of the BIM model proved to be invaluable in ensuring everything fitted first time.</p> <p>Project Manager Robert Steel says that avoiding clashes through BIM modelling saved weeks in lost production time. “We got it right first time so there was no rework and a lot less wastage than usually occurs on jobs done the traditional way without BIM. Labour was more efficient because the team could see how components fitted together in the model. All components were in place, on time.”</p> <p>Dominion Constructors estimate that the time and materials saved by using BIM, due to the high standard of construction and clash avoidance, was worth double the cost of the BIM model.</p>
UoA Engineering School	•	•	•											<p>Sharing design elements while maintaining one version of the ‘truth’ effectively de-risked a highly complex design phase.</p> <p>Applying BIM processes to design reduces rework and duplicated effort – and offers opportunities for building management.</p> <p>Adopting BIM processes to steer design authoring and review, spatial programming, 3D coordination, and engineering and structural analysis asset information delivered a highly</p>

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														<p>coordinated model. MELANIE TRISTRAM, NATIONAL BIM MANAGER, JASMAX</p> <p>“In some projects the prevailing view is that BIM is simply designing in a 3D modelling platform, but that view is incorrect. The BIM processes we developed supported the level of collaboration across project teams critical to the successful development and delivery this complex project.” MELANIE TRISTRAM, NATIONAL BIM MANAGER, JASMAX</p>
Chch Justice & Emergency Precinct	•	•					•	•	•					<p>The Ministry of Justice has found BIM to be an excellent technology platform to assist with stakeholder engagement. The BIM process fast tracked stakeholder consultation and input to the design because the building’s users could digitally sit inside a space and see how it was going to function.</p> <p>The federated model was hugely beneficial in providing assurance in a way that could not have been achieved with traditional 2D plans.</p> <p>BIM has enabled Fletcher Construction to detect clashes and plan in advance to maximise efficiencies and minimise waste.</p> <p>“With one source of truth up on the screen in front of you, BIM can achieve in minutes what usually takes weeks.” JASON HOWDEN, ASSOCIATE TECHNICAL BIM MANAGER, WARREN AND MAHONEY</p> <p>It’s estimated that BIM will cost between 0.5 and 2.5% of the project construction budget.</p> <p>The critical occupiers of the building will have a better experience using it, owing to the myriad of design improvements they were involved in making prior to</p>

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														<p>construction starting; an involvement only made possible through the use of BIM.</p> <p>That the benefits significantly outweigh any costs is best illustrated by the Ministry's insistence that its future projects be constructed using a similar BIM process.</p>
Pukete Wastewater Treatment Plant												●	●	<p>"BIM is often discussed for new builds and assets, but in reality the majority of asset owners own many more assets than they build each year. If we can leverage BIM technologies to operate and maintain existing assets we will capture far more value in the long run." GLENN JOWETT, TECHNICAL DIRECTOR, DIGITAL ENGINEERING & ADVISORY, BECA</p> <p>The council's BIM model is a platform for digital asset management, providing functions to visualise and interrogate more detailed information about its assets. The pace of work has also picked up, now that everyone is working with reliable information – and the days of collecting new survey data at the beginning of each new project are over.</p>